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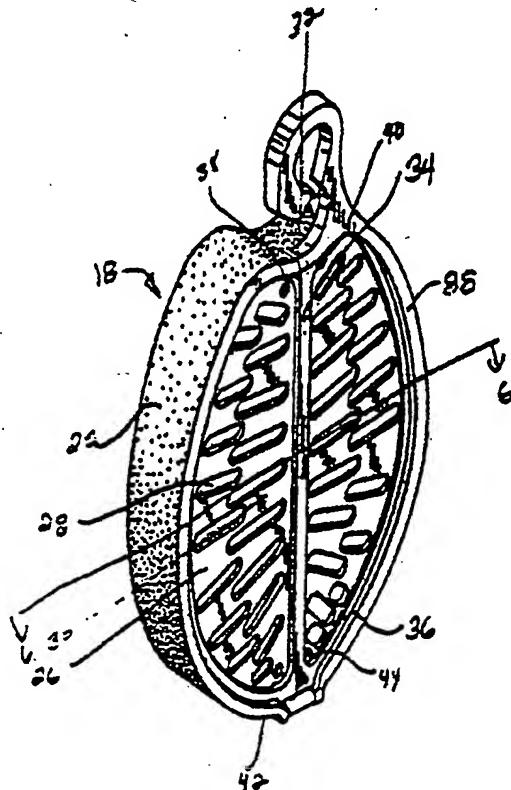
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(54) Title: SOLID CAKE DISIPENSER

(57) Abstract

A dispenser for supplying a quantity of dispenseate to an interior of an automatic dishwasher is disclosed. The dispenser includes a main body portion (18) having a rear wall and an integrally formed sidewall (22). The dispenser also includes a front portion (26) that includes a plurality of perforations (28, 38, 40, 42). The dispenser also includes an integrally formed hinge connecting the main body portion to the front portion. A method of forming a unitary dispenser for depositing a dispenseate into an automatic dishwasher during a washing operation is also disclosed.



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### SOLID CAKE DISPENSER

The present invention is a Continuation-in-part of my copending design patent application number \_\_\_\_\_, filed May 31, 1995 entitled DISPENSER.

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#### Background of the Invention

The present invention relates generally to containers for dispensing solid materials such as fragrances, deodorizers and the like, and more particularly to containers for dispensing solid materials 10 in solid cake form for use in an automatic dishwasher.

The operative environment of automatic dishwashers is conducive to the formation of offensive odors. A substantial portion of consumers using these machines find these odors objectionable. The need exists for an 15 inexpensive, consumer directed means of dispensing fragrances and deodorizers to the interior of such machines to mask odors.

One widely known type of container for dispensing solid deodorizers can be found in diaper pails or garbage 20 cans. Typically, the body of the dispenser is integrally formed into the inner surface of the lid of the pail, has raised sidewalls and a base. A perforated, separate, removable cover is provided to retain a solid deodorant cake within the body of the dispenser.

A known dispenser for use in a dishwasher environment dispenses a sheeting agent such as a water softener cake. The sheeting agent reduces spotting caused by minerals present in the water and detergent residue. The container holding the sheeting agent is substantially 25 basket shaped. The basket has an outer wall which is substantially frustoconical in shape and has a plurality of openings extending through the wall. A base is provided which is integrally formed with the outer wall. The base also contains openings extending through the 30 thickness of the base.

A typical known basket-shaped dispenser is formed from a plastic material. The basket also has a detachable lid which includes a hook for fastening the dispenser to a rack of the interior of a dishwasher. The lid also contains perforations extending through the entire thickness of the lid.

In order to manufacture the product, the basket and lid portions are each individually injection molded. The solid material is inserted into the basket, and then the lid is attached according to conventional means. For example, a plurality of substantially upwardly extending u-shaped connectors are provided on an upper lip of the basket. Corresponding bar-shaped projections are provided on the lid of the basket for snapping into the u-shaped connectors. The bars and connectors are of a size and shape to provide an interference fit.

Such a dispenser is intended for a single use by a consumer. That is, once the solid material within the dispenser has completely dissolved, the consumer throws the device away and replaces it with another filled basket.

Another known product exists whose purpose is to mask automatic dishwasher odors. This product is a solid, substantially plastic body formed of an ethylene vinyl acetate material. This material is impregnated with a fragrance. The body is substantially disk-shaped and is approximately 87 millimeters in diameter and approximately 4 millimeters thick. An integrally formed hook is provided along an outer edge of the disk and is of a shape suitable for hanging the disk on a rack of the interior of the dishwasher.

This known fragrance dispenser has not achieved wide market acceptance. One disadvantage of this product is that the fragrance impregnated within the body does not dispense equal amounts of fragrance during each cycle. 5 Typically, a majority of the fragrance is lost in the first few wash cycles. A dispensate release profile when graphically plotted against time shows that most of the fragrance is dispensed within the first few wash cycles. With each succeeding wash cycle, less fragrance is 10 dispensed. The dispensate release profile shows that the amount dispensed decreases sharply over time, then eventually flattens out. The flattened portion of the curve represents an ineffective amount of fragrance dispensed.

15 Another disadvantage of this device is that the size and appearance of the product does not change from cycle to cycle. The consumer therefore does not receive a visual indication of when the product has lost its effectiveness.

20 The amount of fragrance that can be successfully impregnated into the plastic is limited. The overall size of the product must therefore be selected based on a required surface area needed to dispense an effective amount of fragrance. A relatively large surface area is 25 required to dispense an effective amount of fragrance. The large surface area required dictates an overall dispenser size which can interfere with the operation of the machine, as well as create an obstruction for loading dishes.

30 It would be desirable to provide a compact dispenser for dispensing fragrance into an interior of a dishwasher and which is suitable for withstanding the

harsh environment created by the high operating temperatures, the caustic detergents used and the organic compounds present which are known to adversely affect the dispenser as well as the dispenseate. It would also be 5 desirable to provide a fragrance dispenser suitable for use in an automatic dishwasher, which can be manufactured economically and which provides a visual indication that the dispenseate levels are adequate to mask odors.

Summary of the Invention

10 A dispenser for delivering a substantially solid cake of dispenseate by means of dissolution in an automatic dishwasher environment is described. The dispenser comprises a main body portion including a substantially solid, continuous central cavity for receiving a 15 substantially solid cake of material, the cavity having a rear wall portion and a sidewall portion integrally formed with the rear wall portion. The dispenser further includes a front portion having a plurality of openings extending therethrough of a size sufficient to allow water 20 to enter into an inner cavity of the dispenser, the cavity defined by an inner surface of the rear wall portion, the sidewall portion and the front portion. The dispenser also includes a hinge integrally formed in the main body portion.

25 A method of forming a unitary dispenser suitable for delivering a dispenseate into an automatic dishwasher, the dispenser having a continuous main body portion, a perforated front portion and a hinge connecting the main body portion to the front portion is disclosed. The 30 method comprises the steps of: providing a two plate injection mold having a first cavity shaped to form a substantially continuous main body portion with a back

portion, an integrally formed sidewall and an annular cavity for receiving a substantially solid cake of dispense, wherein the mold has a second cavity for forming a front portion with a plurality of perforations extending therethrough; wherein a passage is provided for fluidly connecting the first and second cavities and for forming an integrally formed hinge between a body portion and a flat front portion; providing a quantity of injection moldable plastic suitable for use within an automatic dishwasher environment; preheating the mold to a temperature effective to promote rapid injection molding; preheating the plastic to a temperature effective to soften the plastic enough for injection molding; injection molding the plastic into the mold; cooling the mold and the plastic to a temperature low enough to substantially solidify the plastic; separating the two plates; and releasing a unitary molded dispenser from the mold.

Description of the Drawings

Figure 1 is a perspective view of a preferred embodiment of the dispenser of the present invention, shown in an automatic dishwasher environment.

Figure 2 is a perspective view of a preferred embodiment of the dispenser of the present invention.

Figure 3 is a rear elevational view of a preferred embodiment of the dispenser of the present invention.

Figure 4 is an exploded perspective view of a preferred embodiment of the dispenser of the present invention, showing a substantially solid cake containing a preferred fragrance for freshening the interior of an automatic dishwasher.

Figure 5 is a cross-sectional view of the hinge connecting the main body portion and the front plate of a preferred dispenser of the present invention.

Figure 6 is a cross-sectional view taken along 5 line 6 -- 6 as shown in Figure 2.

Detailed Description of the Preferred Embodiments

Figure 1 is a perspective view of a preferred solid cake dispenser 10 of the present invention. Preferably, the dispenser 10 is formed of a material 10 suitable for extended operation in an automatic dishwasher environment. What is meant by "extended operation" is lasting through at least fifty cycles. The dispenser 10 of the present invention includes a fastening device which preferably includes an integrally formed hook 12 which is 15 of a size and shape suitable for connecting the dispenser 10 to a wire rack 14 of an automatic dishwasher 16.

The material of construction of the dispenser 10 must withstand multiple dishwasher cycles. The dispenser 10 is exposed to severe operating conditions encountered 20 in an automatic dishwasher. For example, The material used to form the container of the present invention must be suitable for exposure to water temperatures as high as 120 degrees F (49 degrees C), and air temperatures as high 140 degrees F (60 degrees C) encountered during the drying 25 cycle. The material must be resistant to caustic detergents, and many organic compounds found in an automatic dishwasher environment. It was surprisingly discovered that polypropylene plastic is suitable for this purpose, and this is the preferred material of 30 construction. It is to be understood that other suitable plastics can also be used for forming the container 10 of the present invention.

A perspective view of the preferred container 10 is shown in more detail in Figure 2. The container 10 has a main body portion 18 having a back portion 20 (shown in Figure 3) and a sidewall portion 22 integrally formed with the back portion 20. The back portion 20 and integrally formed sidewall portion 22 together define a central cavity 24 (shown in Figure 4) for receiving a substantially solid cake of a dispense 46, such as a substantially solid, water soluble fragrance cake.

The preferred container 10 also includes a front plate 26 having a plurality of elongated openings 28 extending therethrough. Preferably, the elongated openings 28 are sized to allow a sufficient amount of water to penetrate into the cavity 24 to release an effective amount of dispense. The openings 20 are preferably narrow enough to prevent foreign matter such as food particles from entering into the cavity and are large enough to provide a visual indication of an amount of dispense remaining in the container 10. Preferably, thirty-two elongated openings 28, each opening having a major axis, 30 for example extend in a direction substantially perpendicular to a major axis 32 of the container 10. Each opening 28 has an average opening length of 10 millimeters, and an average width of 1.5 millimeters. It is to be understood that "substantially perpendicular" includes major axes 30 which are slightly skewed, i.e. up to 60 degrees with respect to the vertical major axis 32.

The front plate 26 is preferably substantially flat. In the preferred embodiment, the front plate 26 has a raised central portion 34 which strengthens the front plate 26. The preferred front plate 26 also has a raised

perimeter 36 which also adds to the overall strength and stiffness of the front plate 26.

The front plate 26 also has four substantially identical circular openings 38, 40, 42 and 44 extending through upper and lower surfaces of the front plate 26 which are provided to allow additional water to enter into the central cavity 24. The lower openings 42 and 44 serve as drain holes for the central cavity 24. The central cavity 24 can also drain through an opening between an outer perimeter of a lower portion of the front plate 26 and an inner perimeter of a lower portion of the main body portion 18.

Referring now to Figure 3, the preferred main body portion 18 is substantially oblong in shape, and includes a decorative portion 48 resembling two leaves, and a substantially flat, smooth surface portion 50 for imprinting a product name onto an outer surface of the dispenser 10. Preferably, the remaining outside surface of the main body portion 18 is textured.

Preferably, the hook 12 has a substantially circular opening 52 that is large enough to be positioned over a plastic covered wire member of a dishwasher rack 14 (shown in Figure 1). An opening 54 in a lower portion of the hook 12 is smaller than an outer diameter of a plastic covered wire member so that the dispenser 10 remains securely fastened to the wire member during operation of the dishwasher. The material used to form the main body portion 18 (shown in Figure 2) as well as the hook 12 is flexible enough for the hook 12 to be temporarily deformed by the consumer in order to position the hook 12 over the plastic covered wire member. The material should also be rigid enough to prevent the hook 12 from being

disconnected from the wire rack upon exposure to the water jet spray of the dishwasher.

An exploded perspective view of the dispenser 10 of the present invention, including a water soluble dispense 46 is shown in Figure 4. As shown in Figure 4, the preferred dispenser 10 includes three retaining pins 56, 58, 60 which are integrally formed with the main body portion and are long enough to contact an inner surface 62 of the front plate 26 when the front plate is closed (shown in Figure 2). The retaining pins 56, 58 and 60 also serve to position the front plate in the proper assembly location and provide the desired tension.

The front plate 26 lies in a plane 71 when the front plate 26 is in the closed position (shown in Figure 2). Preferably, each retaining pin 56, 58 and 60 is substantially tubular and has a central cylindrical axis 64, 66, 68 which is equally spaced along and is perpendicular to a plane 71.

The preferred dispense 46 is wax-based and contains a quantity of fragrance that is released upon the application of a heat sufficient to melt a portion of the wax. An example of a commercially available dispense that would be suitable for this purpose is described in U.S. Patent 4,545,917 by Smith and Kellett, Jr.

Preferably, the dispense 46 has a shape which fits snugly within the central cavity 24 of the dispenser 10. Most preferably, the dispense 46 has three throughbores 72, 74 and 76 for accepting the retaining pins 56, 58 and 60. The retaining pins and throughbores together cooperate to retain the dispense 46 centrally in the inner cavity 24 until the dispense 46 is completely dissolved.

Most preferably, the dispensate 46 is formulated to dispense a quantity of fragrance sufficient to mask the unpleasant odors in an automatic dishwasher, and to continue to dispense a sufficient amount of fragrance over 5 multiple cycles. In order to be commercially acceptable, the dispensate 46 should adequately mask odors for at least fifty dishwashing cycles.

The present invention also includes an integrally formed hinge which is shown in cross-section in Figure 5. 10 This cross-sectional view is taken along line 5 -- 5 in Figure 4. The front plate 26 terminates at a lower end 78 with a flexible integrally formed hinge member 80. Hinge member 80 is integrally formed with a hinge receiving member 82 located on a lower end 84 of the main body portion 18. The attachment of the main body portion 18 to the front plate 26 advantageously permits manufacture of 15 the device of the present invention as a single injection molded part.

A further advantage of the preferred hinge member 20 80 is that when the front plate 26 is in the closed position, the a majority of the outer surface of the hinge member 80 is positioned below a plane defined by the upper edges 88 (shown in Figures 2 and 4) of the main body portion 18. A majority of the hinge member 80 is recessed 25 with respect to the upper edges 88 of the main body portion 18.

A cross-sectional view of the dispenser 10 taken along line 6 -- 6 in Figure 2 is shown in Figure 6. The back portion 20 and sidewall portion 22 are substantially 30 of the same thickness. Preferably, the wall thickness of the back portion 20 and sidewall portion 22 is about 2.5 millimeters.

The present invention includes a locking device which secures the front plate 26 against the main body portion 18. Preferably, as shown in Figure 6, an outer perimeter of the front plate 26, including the raised portion 36 has an outer edge 85 which contacts an inner edge 86 of the main body portion 18 when the front plate 26 is closed against the main body portion 18, forming a "positive" lock. What is meant by "positive" for purposes of this disclosure is essentially a one-way lock. That is, once the dispenseate is inserted into the cavity and the front plate closed onto the main body portion, the front plate cannot be removed without considerable effort, and/or tools. This is an essential safety feature of the device of the present invention.

Preferably, the inner and outer edges 86 and 85 have an annular profile which in cooperation tightly and positively lock the front plate 26 in the main body portion 26.

Advantageously, the front plate 26 is slightly recessed into the sidewall portion 22 to create the appearance that the front plate 26 is permanently installed, further deterring consumers from attempting to gain access to the dispenseate.

In an alternate embodiment (not shown) the inner surface of the sidewalls has a recessed edge substantially parallel to the raised portion and receives a lower edge of the front portion. Such a configuration provides a lead in to the proper assembly location and tension and provides a more positive lock between the main body portion and the front plate.

The present invention also includes a method of forming a dispenser for delivering a dispenseate into an

automatic dishwasher. The dispenser includes a substantially continuous main body portion having a rear wall, a sidewall portion integrally formed into the rear wall, and an inner cavity defined by the inner surfaces of 5 the rear wall and sidewalls. Preferably, the main body portion is oblong in shape, and the region of the wall where the rear wall and sidewalls intersect is curved and substantially continuous.

The dispenser also has a front plate including a plurality of openings extending therethrough. The front plate and main body portions are joined together by a flexible hinge, and together the three components are injection molded into a single part.

The first step in the process of the present invention is to provide a two-plate mold for forming the part. The two plate mold has a first cavity shaped to form the main body portion and a second cavity shaped to form the front plate. Each cavity is fluidly connected, the passage defining the hinge in the final part.

20 The hinge is preferably located in the parting line interface between the two plates. This configuration advantageously permits both the main body portion and the front plate to be injection molded in a single step.

The method of the present invention includes 25 preheating the mold to a temperature appropriate for injection molding the selected material. In the case of polypropylene, the mold should be raised to a temperature between about 90 degrees F and 120 degrees F.

At the same time, or after the mold is heated, the 30 plastic to be molded is heated to a working temperature sufficient for injection molding. Preferably,

polypropylene is preheated to between 400 degrees F and 460 degrees F.

Preferably, about 9.5 grams of polypropylene are injected to form each container. Next, the mold is cooled 5 to a temperature which assures the plastic is solidified. The plates are then separated, and the part is released from the mold. Preferably, the part is released simultaneously with the separation of the plates.

The use of a two plate mold eliminates the need to 10 use accessory cams or collapsible cores. The tooling cost is therefore minimized, and production costs are low.

Also, the fact that the dispenser is manufactured 15 as a unitary component further reduces the tooling and assembly costs. The method of the present invention provides an inexpensive, disposable dispenser that is ideal for dispensing fragrance in the form of a waxy cake into a dishwasher during operation.

Although the present invention has been described 20 with reference to the preferred embodiments, workers skilled in the art will recognize that changes may be made in form and detail without departing from the spirit and scope of the invention.

## IN THE CLAIMS:

What is claimed is:

- 5        1. A dispenser for delivering a substantially solid cake of dispense by means of dissolution in an automatic dishwasher environment, comprising:
  - 10              a main body portion including a substantially solid, continuous central cavity for receiving a substantially solid cake of material, the cavity having a rear wall portion and a sidewall portion integrally formed with the rear wall portion;
  - 15              a front portion having a plurality of openings extending therethrough of a size sufficient to allow water to enter into an inner cavity of the dispenser, the cavity defined by an inner surface of the rear wall portion, the sidewall portion and the front portion; and
  - 20              a hinge integrally formed in the main body portion and front portion.
- 25        2. The device of claim 1 and further comprising a fastening device connected to an outer surface of the main body portion, suitable for fastening to a wire rack of an automatic dishwasher.
- 30        3. The device of claim 1 wherein the openings are large enough to provide a visual indication of a size of a cake of material remaining within the cavity.

4. The device of claim 1 and further providing a plurality of projections extending from an inner surface of the rear wall portion to an inner surface of the front portion for retaining the cake in a selected position during use.

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5. The device of claim 4 wherein each projection is substantially cylindrical in shape.

10 6. The device of claim 5 wherein each projection is spaced apart and wherein each projection has a central cylindrical axis which is substantially perpendicular to a plane coextensive with the front portion when the front portion is in a closed position.

15 7. The device of claim 1 wherein the main body portion is substantially oblong in shape.

20 8. The device of claim 2 wherein the fastening device comprises a hook, and wherein the sidewall portion and main body portion are integrally formed in a manner which allows water to escape when the device is suspended from the hook.

25 9. The device of claim 1 and further comprising a locking device for locking the front portion to the main body portion.

30 10. The device of claim 9 wherein the locking device comprises:  
an outer edge surrounding the front portion; and

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an inner edge positioned within an upper edge of the main body portion, wherein the inner and outer edges each have an annular profile which cooperates to position the main body portion and front portion in a positive locking relationship.

10

11. The device of claim 1 wherein the main body portion, front portion and hinge are formed from polypropylene plastic.

15

12. The device of claim 1 wherein the openings are of a size and are positioned to minimize entry of debris into the cavity.

20

13. The device of claim 1 wherein the main body portion is water impermeable.

25

14. A method of forming a unitary dispenser suitable for delivering a dispense into an automatic dishwasher, the dispenser having a continuous main body portion, a perforated front portion and a hinge connecting the main body portion to the front portion, comprising the steps of:

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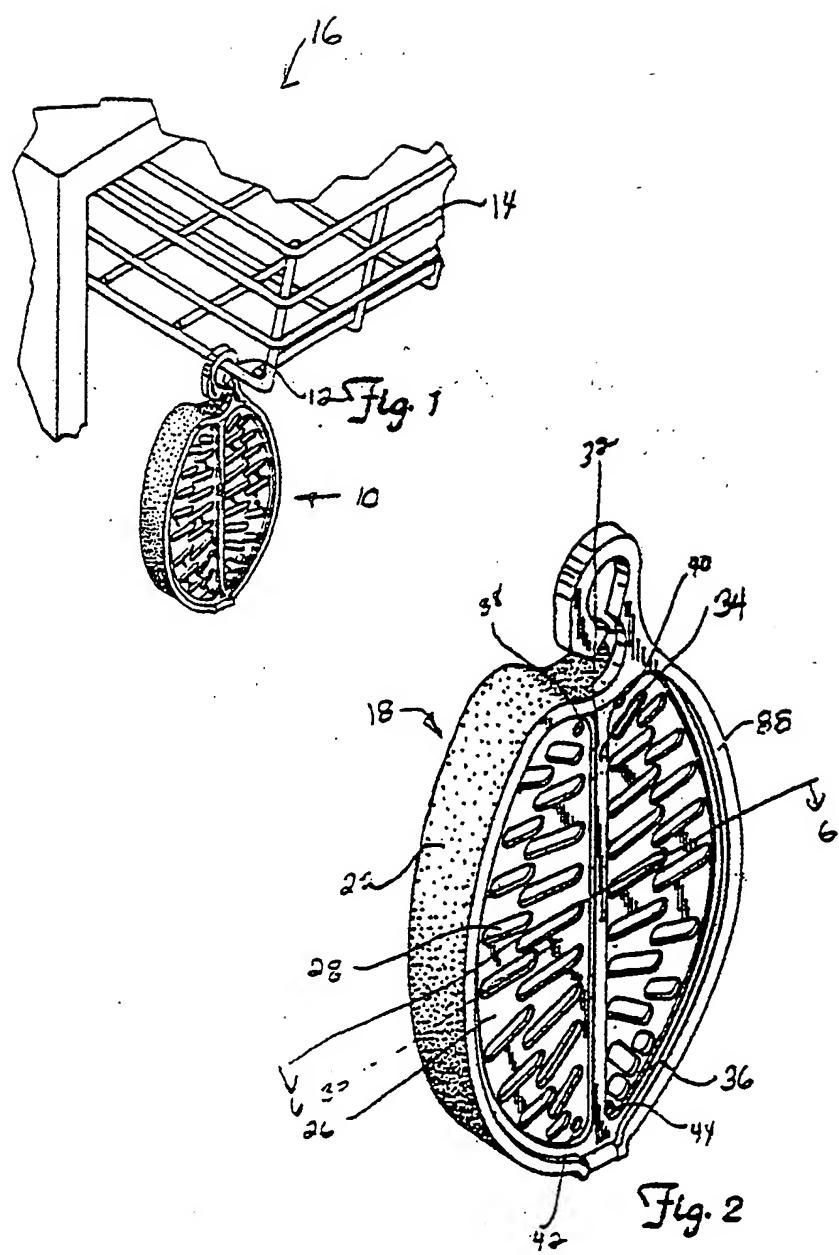
providing a two plate injection mold having a first cavity shaped to form a substantially continuous main body portion with a back portion, an integrally formed sidewall and an annular cavity for receiving a substantially solid cake of dispense, wherein the mold has a second cavity for forming a front portion with a plurality of

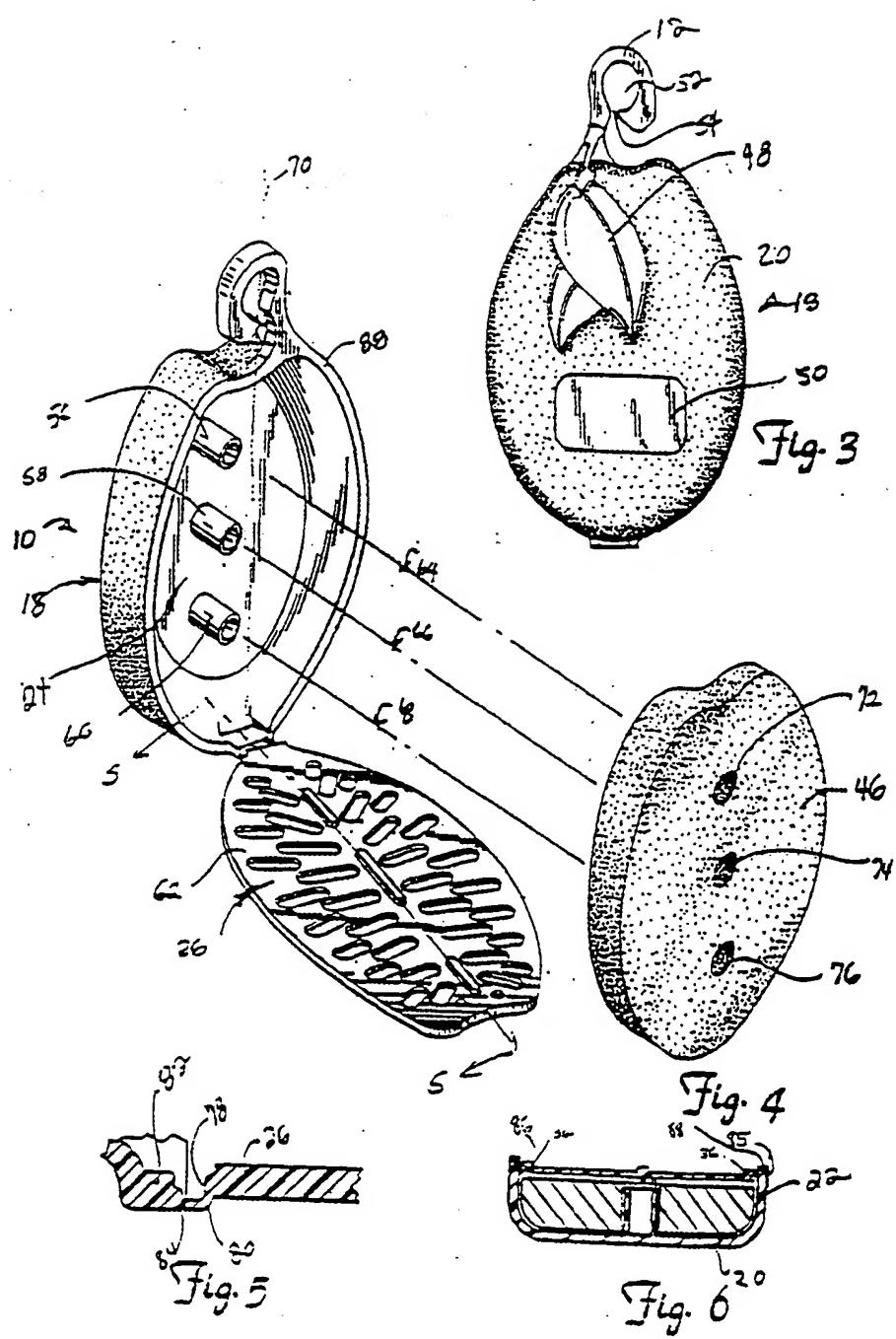
perforations extending therethrough; wherein  
a passage is provided for fluidly connecting  
the first and second cavities and for  
forming an integrally formed hinge between a  
body portion and a flat front portion;  
providing a quantity of injection moldable plastic  
suitable for use within an automatic  
dishwasher environment;  
5 preheating the mold to a temperature effective to  
promote rapid injection molding;  
10 preheating the plastic to a temperature effective  
to soften the plastic enough for injection  
molding;  
preheating the mold to a temperature effective to  
soften the plastic enough for injection  
molding;  
15 injection molding the plastic into the mold;  
cooling the mold and the plastic to a temperature  
low enough to substantially solidify the  
plastic;  
separating the two plates; and  
releasing a unitary molded dispenser from the  
20 mold.

15. The method of claim 14 wherein the passage is  
located in a parting line interface of the two plate mold.

25 16. The method of claim 14 wherein the steps of  
separating the plates and releasing are performed  
simultaneously.

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## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US96/07984

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :E03D 9/02; B29C 45/72  
US CL :206/77.1; 68/17R; 134/93; 510/439, 440; 4/231; 422/277; 264/242

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 206/77.1; 68/17R; 134/93; 510/439, 440; 4/231; 422/264, 266, 277; 264/242

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 2,687,157 A (C. J. COWAN) 24 August 1954 (24.08.54), see entire document and Figures 1 and 6.	14-16
Y ----	US 2,973,600 A (G. B. REILLY ET AL) 07 March 1961 (07.03.61), see column 1, lines 26-32 and Figure 3.	5, 6 -----
A		1-4, 7-16
Y	US 4,615,054 A (H. BEUCHELER ET AL) 07 October 1986 (07.10.86), see column 2, line 43 to column 3, line 9 and Figures.	1-16
Y, P	US 5,460,718 A (D. WECK ET AL) 24 October 1995 (24.10.95), see column 5, lines 27-33.	11
Y	DE 3817373 A (GLOBOL-WERK GMBH) 30 November 1989 (30.11.89), see abstract and Figures.	1-16

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later documents published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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Date of the actual completion of the international search	Date of mailing of the international search report
16 AUGUST 1996	05 SEP 1996

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US96/07984

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 93/16242 A1 (NETABRYMAC PTY. LTD.) 19 August 1993 (19.08.93), see entire document.	1-16

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